

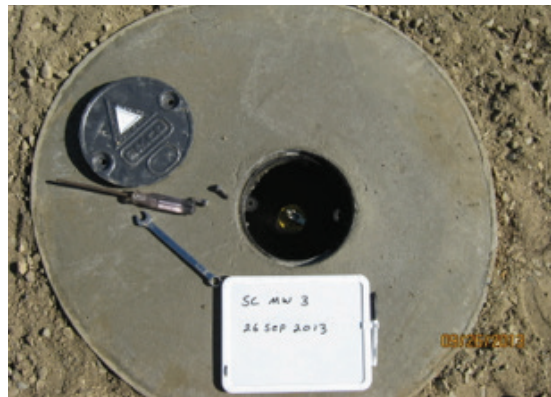
Dry Wells: Using Stormwater as a Resource while Protecting Groundwater Quality



PROJECT PURPOSE

This project will evaluate the risk to groundwater quality associated with infiltrating stormwater runoff through dry wells with pre-treatment facilities. To accomplish this goal, the City of Elk Grove has brought together a team of surface water and groundwater hydrologists and toxicologists from Cal/EPA's Office of Environmental Health Hazard Assessment, Willdan Engineering, and local consulting firms. The project is funded by a California State Water Resources Control Board Proposition 84 Stormwater Planning and Monitoring Grant.

Strawberry Creek Water Quality Basin Investigation Boring/Monitoring Wells



KEY ASPECTS OF THE PROJECT

- The project is comprised of two site locations in Elk Grove: a residential neighborhood and a commercial parking lot.
- Monitoring wells are constructed at each site, upgradient and downgradient of the dry well system to monitor vadose zone and groundwater quality (Figure 1).
- Water quality monitoring will be performed four times per year for two years.
- Stormwater samples will be collected from the dry well system at two locations (Figure 1) during significant storm events.
- Post-storm event groundwater samples will be collected from all monitoring wells.
- Analytes to be measured include volatile and semi-volatile organics, pesticides/herbicides, combustion by-products (PAHs), metals, and conventional water quality parameters.
- Flow rates will be measured and estimates of groundwater recharge capacity will be made.
- Risk of groundwater quality degradation associated with dry well use will be determined.
- Potential for long term migration of contaminants through sub-surface and mobilization of naturally occurring metals will be modeled by Land, Air and Water Resource Department, UC Davis.

BACKGROUND

Watershed urbanization can result in increased flood risks and degradation of water quality and aquatic habitat due to hydromodification. Low Impact Development (LID) techniques may help reduce these impacts. However, in many areas throughout California, the use of LID techniques is challenging due to poor infiltrative capabilities associated with clay soils. One solution is to bypass these low-permeability clay zones through the use of dry wells; vertical infiltration pipes which are deeper than they are wide. When combined with LID pre-treatment, dry wells can recharge the aquifer with little, if any risk of groundwater quality. Furthermore, this combined approach will decrease stormwater runoff and may reduce the adverse impacts of hydromodification on receiving water bodies. The goal of this project is to further quantify the benefits and potential risks of using dry wells to accomplish multiple objectives.

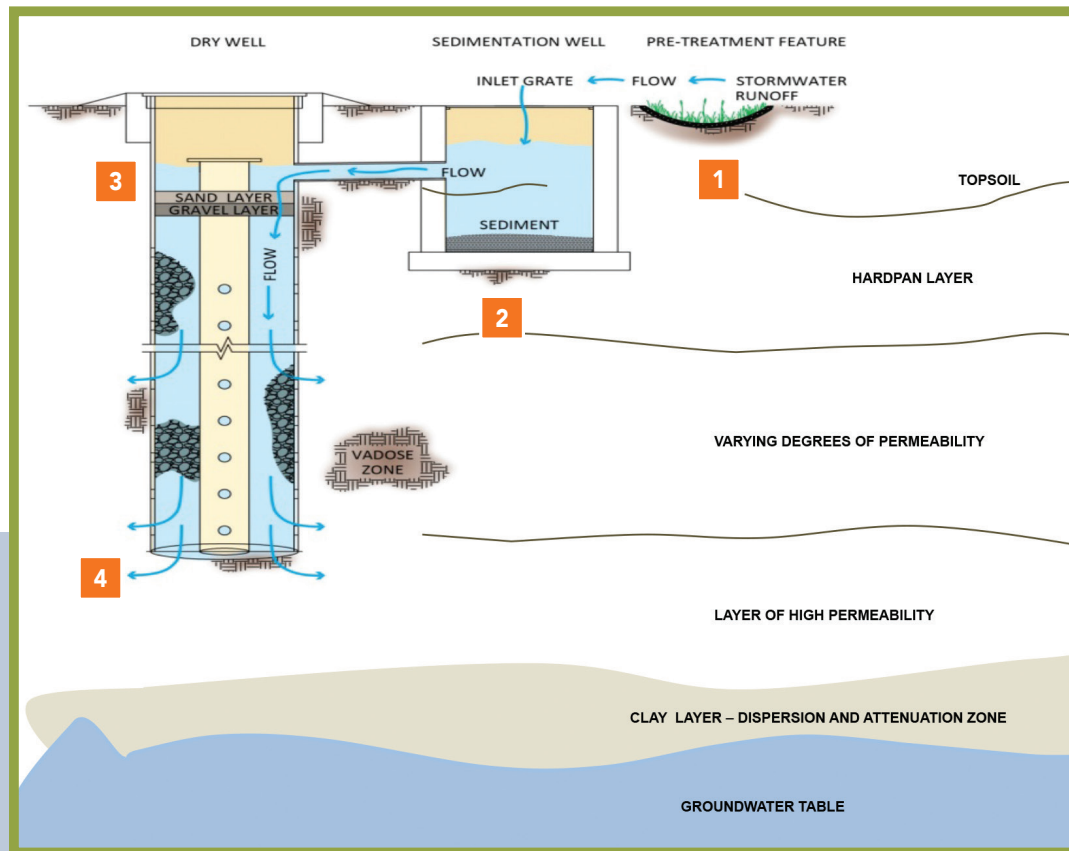


FIGURE 1: DRY WELL SYSTEM UNDER EVALUATION IN THE ELK GROVE PROJECT

1. Stormwater will enter a vegetated pre-treatment facility such as a swale or bioretention cell. Sediment will be captured through the swale or bioretention cell. Approximately 70% of stormwater pollutants are associated with sediment; and this is the first step in the treatment train to help reduce the contaminant load prior to entering the dry well.
2. Stormwater will subsequently flow into a sedimentation basin that will further allow particulates to fall out, thereby reducing pollutants entering the dry well. The sedimentation basin is a 4 foot square concrete vault that can be cleaned out as sediment accumulates. The volume of sediment that accumulates will also provide data on the effectiveness of the vegetated pre-treatment as well as provide information on the maintenance requirements of future dry well systems.
3. The upper layers of the dry well system will contain sand and gravel to further trap fine particulates. This portion of the dry well will be easily accessible for removal and replacement of sand and gravel as necessary for maintenance purposes. The majority of the dry well will be filled with large gravel and stones. The interior pipe will permit access to water in the dry well for sampling and water level determinations.
4. The bottom of the dry well will sit in a layer of permeable sub-surface material to optimize infiltration capacity. Further, beneath this permeable layer, there will be a layer of low permeability material such as clay that will function to disperse the dry well effluent laterally and serve as a final site of pollutant attenuation.



REGIONAL AND STATEWIDE SIGNIFICANCE

In California, dry wells are used infrequently and with caution due to the concern that they may provide a conduit for contaminants to enter the groundwater. This contrasts with neighboring states such as Arizona and Oregon, where dry wells are used extensively as stormwater and flood control management tools. Results of this project along with a comprehensive literature review should provide scientific information on the risk to groundwater quality associated with dry well use in urban areas. This information will be used by decision makers to determine appropriate guidelines for dry wells in the Sacramento region and throughout the State of California.

This project is in partnership with:

